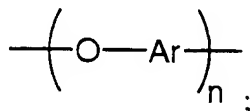


# CLAIMS

We claim:

1. A polyaromatic ether comprising the formula:

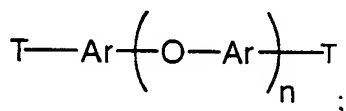


wherein Ar is an independently selected divalent aromatic radical; and

wherein n is an integer greater than or equal to 7.

2. The polyaromatic ether of claim 1,  
wherein the divalent aromatic radical is m- or p-phenylene.

3. An aromatic ether oligomer comprising the formula:



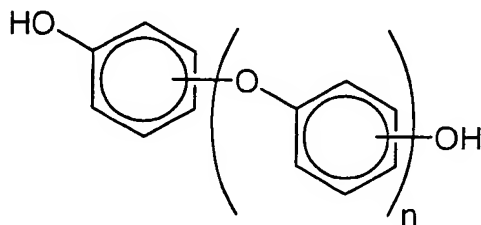
wherein Ar is an independently selected divalent aromatic radical;

wherein T is a terminating group independently selected from the group consisting of  
-OH and -X;

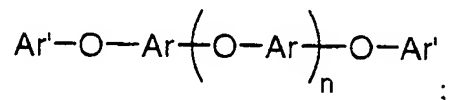
wherein X is independently selected from the group consisting of Br and I; and

wherein n is an integer greater than or equal to 1.

4. The aromatic ether oligomer of claim 3,  
wherein n is less than or equal to about 100.
5. The aromatic ether oligomer of claim 3,  
wherein n is selected from the group consisting of 2, 4, 6, and 8.
6. The aromatic ether oligomer of claim 3,  
wherein both terminating groups are -OH; and  
n is an even integer greater than or equal to 2.
7. The aromatic ether oligomer of claim 6,  
wherein the aromatic ether oligomer comprises the formula:



8. An aryl-terminated aromatic ether oligomer comprising the formula:



wherein Ar is an independently selected divalent aromatic radical;

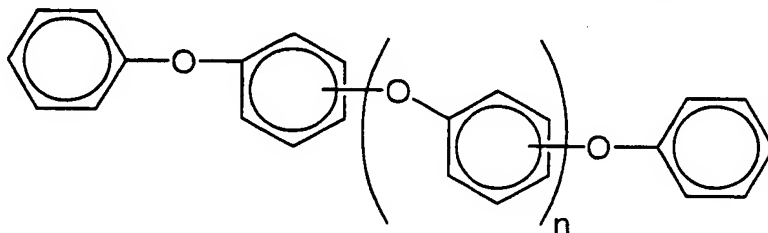
wherein Ar' is an independently selected monovalent aromatic radical;

wherein n is an even integer greater than or equal to 2; and

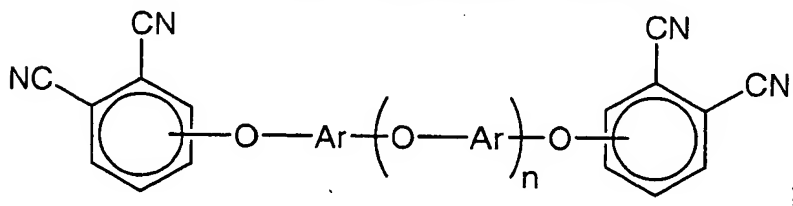
wherein n is not equal to 4 when every Ar is m-phenylene and every Ar' is phenyl.

9. The aryl-terminated aromatic ether oligomer of claim 8,

wherein the aromatic ether oligomer comprises the formula:



10. A phthalonitrile monomer comprising the formula:



wherein Ar is an independently selected divalent aromatic radical; and

wherein n is an even integer greater than or equal to 2.

11. The aromatic ether oligomer of claim 10,

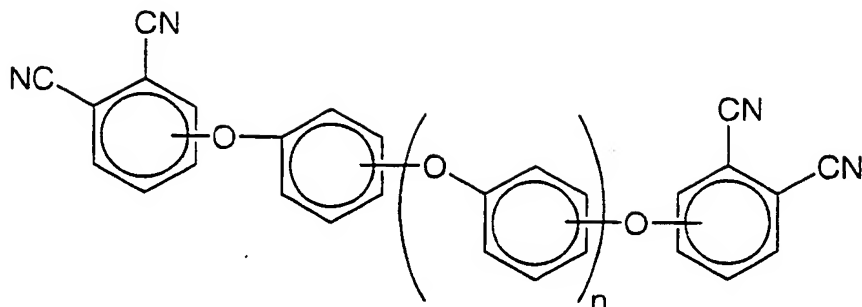
wherein n is less than or equal to about 100.

12. The phthalonitrile monomer of claim 10,

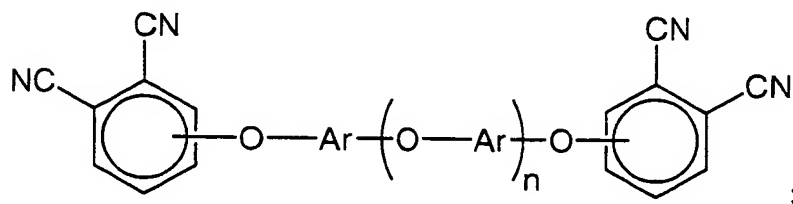
wherein n is selected from the group consisting of 2, 4, 6, and 8.

13. The phthalonitrile monomer of claim 10,

wherein the phthalonitrile monomer comprises the formula:

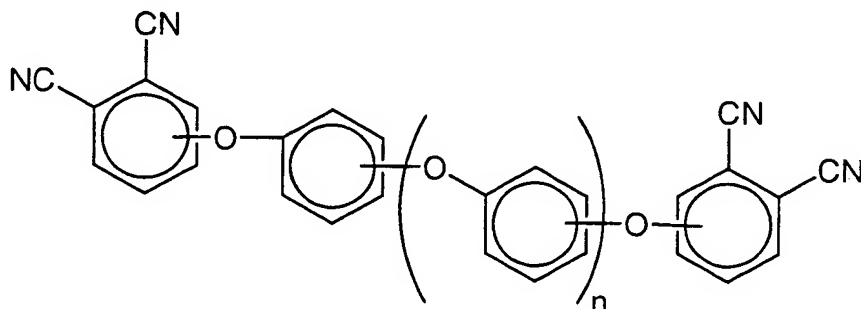


14. A thermoset formed by curing a mixture comprising a phthalonitrile monomer comprising the formula:



wherein Ar is an independently selected divalent aromatic radical; and  
wherein n is an even integer greater than or equal to 2.

15. The thermoset of claim 14,  
wherein n is less than or equal to about 100.
16. The thermoset of claim 14,  
wherein n is selected from the group consisting of 2, 4, 6, and 8.
17. The thermoset of claim 14,  
wherein the phthalonitrile monomer comprises the formula:



18. The thermoset of claim 14,  
wherein the mixture comprises more than one phthalonitrile monomer.
19. The thermoset of claim 18,  
wherein the more than one phthalonitrile monomers comprise more than one value for n.

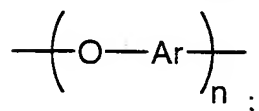
20. The thermoset of claim 14,

wherein the mixture further comprises a compound selected from the group consisting of 4,4'-bis(3,4-dicyanophenoxy)biphenyl, bis[4-(3,4-dicyanophenoxy)phenyl]dimethylmethane, bis[4-(2,3-dicyanophenoxy)phenyl]dimethylmethane, bis[4-(3,4-dicyanophenoxy)phenyl]-bis(trifluoromethyl)methane, bis[4-(2,3-dicyanophenoxy)phenyl]-bis(trifluoromethyl)methane, 1,3-bis(3,4-dicyanophenoxy)benzene, and 1,4-bis(3,4-dicyanophenoxy)benzene.

21. The thermoset of claim 14,

wherein the mixture further comprises a compound with one or more phthalonitrile groups.

22. A process of preparing a polyaromatic ether comprising the formula:



wherein Ar is an independently selected divalent aromatic radical;

comprising the step of reacting a dihydroxyaromatic with a dihaloaromatic;

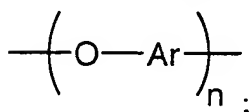
wherein neither the dihydroxyaromatic nor the dihaloaromatic is present in an excess amount; and

wherein the reaction is performed in the presence of a copper compound and cesium carbonate.

23. The process of claim 22,

wherein the copper compound is selected from the group consisting of CuI and CuBr.

24. A process of preparing a polyaromatic ether comprising the formula:



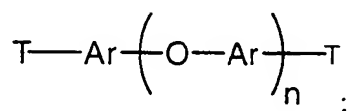
wherein Ar is an independently selected divalent aromatic radical;

comprising the step of reacting a halohydroxyaromatic in the presence of a copper compound and cesium carbonate.

25. The process of claim 24,

wherein the copper compound is selected from the group consisting of CuI and CuBr.

26. A process of preparing an aromatic ether oligomer comprising the formula:



wherein Ar is an independently selected divalent aromatic radical;

wherein T is a terminating group independently selected from the group consisting of  
-OH and -X;

wherein X is independently selected from the group consisting of Br and I;

wherein n is an integer greater than or equal to 1;

comprising the step of reacting a dihydroxyaromatic with a dihaloaromatic;

wherein the reaction is performed in the presence of a copper compound and cesium carbonate; and

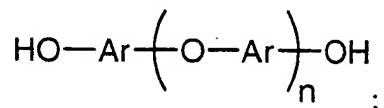
wherein either the dihydroxyaromatic or the dihaloaromatic is present in an excess amount.

27. The process of claim 26,

wherein the copper compound is selected from the group consisting of CuI and CuBr.

28. The process of claim 26,

wherein the dihydroxyaromatic is present in an excess amount to form a hydroxy-terminated aromatic ether oligomer comprising the formula:



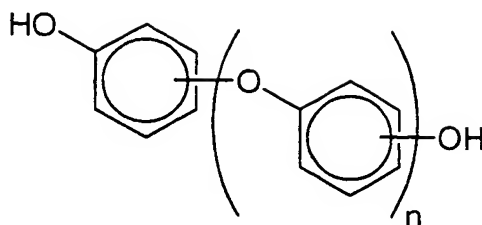
wherein n is an even integer greater than or equal to 2.

29. The process of claim 28,

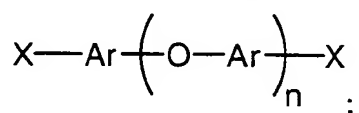
wherein the dihydroxyaromatic is selected from the group consisting of resorcinol, hydroquinone, and combinations thereof;

wherein the dihaloaromatic is selected from the group consisting of m-dibromobenzene, p-dibromobenzene, m-diiodobenzene, p-diiodobenzene, m-bromoiodobenzene, p-bromoiodobenzene, and combinations thereof; and

wherein the hydroxy-terminated aromatic ether oligomer formed by the process comprises the formula:

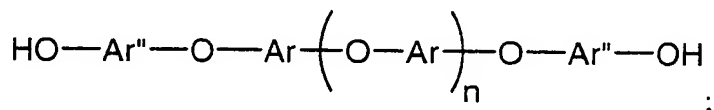


30. The process of claim 26,  
wherein the dihaloaromatic is present in an excess amount to form a halo-terminated aromatic ether oligomer comprising the formula:



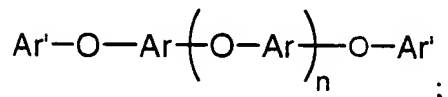
wherein n is an even integer greater than or equal to 2.

31. The process of claim 30,  
further comprising the step of reacting the halo-terminated aromatic ether oligomer with a dihydroxyaromatic to form a hydroxy-terminated aromatic ether oligomer comprising the formula:



wherein Ar'' is a divalent aromatic radical.

32. A process of preparing an aryl-terminated aromatic ether oligomer comprising the formula:



wherein Ar is an independently selected divalent aromatic radical;

wherein Ar' is an independently selected monovalent aromatic radical; and

wherein n is an even integer greater than or equal to 2;

comprising the steps of:

reacting a dihydroxyaromatic with a dihaloaromatic to form an aromatic ether oligomer;

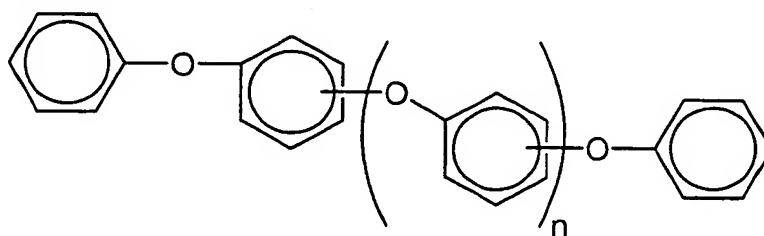
wherein either the dihydroxyaromatic or the dihaloaromatic is present in an excess amount; and

wherein the reaction is performed in the presence of a copper compound and cesium carbonate; and

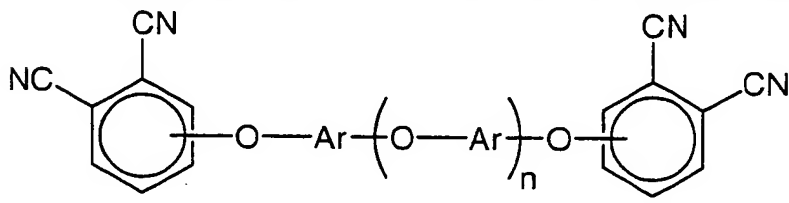
reacting the product of the previous step with either a haloaromatic or a hydroxyaromatic;  
wherein the haloaromatic is used if the previous step used an excess of dihydroxyaromatic; and  
wherein the hydroxyaromatic is used if the previous step used an excess of dihaloaromatic.

33. The process of claim 32,  
wherein the copper compound is selected from the group consisting of CuI and CuBr.
34. The process of claim 32,  
wherein the dihydroxyaromatic is present in an excess amount; and  
wherein the haloaromatic is used.
35. The process of claim 32,  
wherein the aryl-terminated aromatic ether oligomer formed by the process comprises

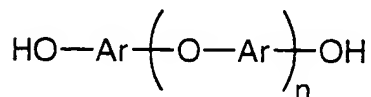
the formula:



36. A process of preparing a phthalonitrile monomer comprising the formula:

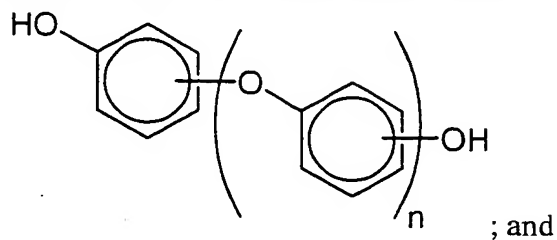


wherein Ar is an independently selected divalent aromatic radical; and  
wherein n is an even integer greater than or equal to 2;  
comprising the step of reacting a 3- or 4-nitrophthalonitrile with a hydroxy-terminated aromatic ether oligomer comprising the formula:

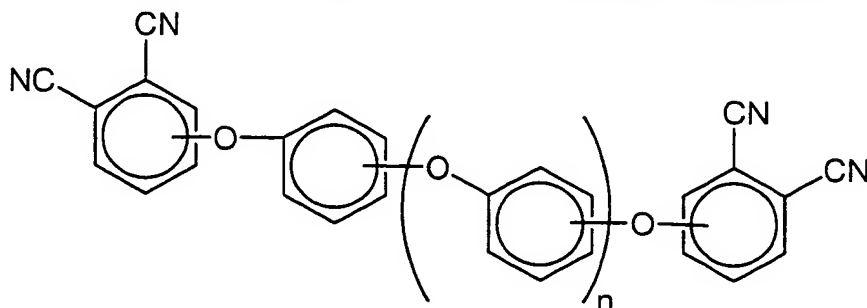


37. The process of claim 36,

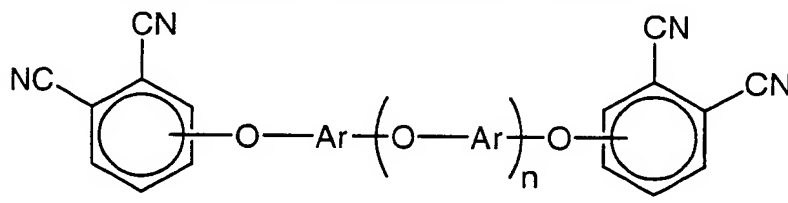
wherein the hydroxy-terminated aromatic ether oligomer comprises the formula:



wherein the phthalonitrile monomer formed by the process comprises the formula:



38. A process of preparing a thermoset comprising the step of curing a mixture comprising a phthalonitrile monomer comprising the formula,

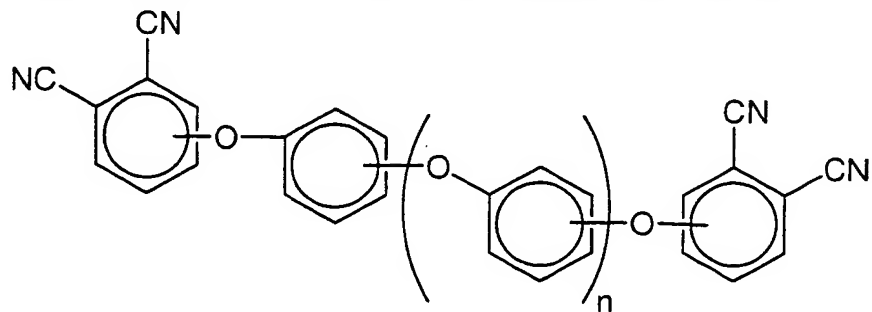


wherein Ar is an independently selected divalent aromatic radical; and

wherein n is an even integer greater than or equal to 2.

39. The process of claim 38,

wherein the phthalonitrile monomer comprises the formula:



40. The process of claim 38,

wherein the mixture comprises more than one phthalonitrile monomer.

41. The process of claim 39,  
wherein the more than one phthalonitrile monomers comprise more than one value for  
n.
42. The process of claim 38,  
wherein the mixture further comprises a compound selected from the group  
consisting of 4,4'-bis(3,4-dicyanophenoxy)biphenyl, bis[4-(3,4-  
dicyanophenoxy)phenyl]dimethylmethane, bis[4-(2,3-  
dicyanophenoxy)phenyl]dimethylmethane, bis[4-(3,4-  
dicyanophenoxy)phenyl]-bis(trifluoromethyl)methane, bis[4-(2,3-  
dicyanophenoxy)phenyl]-bis(trifluoromethyl)methane, 1,3-bis(3,4-  
dicyanophenoxy)benzene, and 1,4-bis(3,4-dicyanophenoxy)benzene.
43. The process of claim 38,  
wherein the mixture further comprises a compound with one or more phthalonitrile  
groups.
44. The process of claim 38,  
wherein the mixture further comprises a curing agent.
45. The process of claim 44,  
wherein the curing agent comprises a composition selected from the group consisting  
of aromatic amines, primary amines, secondary amines, diamines,  
polyamines, amine-substituted phosphazenes, phenols, strong acids, organic  
acids, strong organic acids, inorganic acids, metals, metallic salts, metallic salt  
hydrates, metallic compounds, halogen-containing aromatic amines, clays,  
and chemically modified clays.
46. The process of claim 44,  
wherein the curing agent is selected from the group consisting of bis[4-(4-  
aminophenoxy)phenyl]sulfone, 1,4-bis(3-aminophenoxy)benzene, 1,12-  
diaminododecanediphenylamine, epoxy amine hardener, 1,6-hexanediamine,  
1,3-phenylenediamine, p-toluenesulfonic acid, cuprous iodide, cuprous  
bromide, stannous chloride, stannous chloride hydrates, stannous chloride  
dihydrate, aluminum nitrate hydrates, aluminum nitrate nonahydrate,  
montmorillonite, and chemically modified montmorillonite.

47. A process of preparing a thermoset comprising the steps of:  
reacting a dihydroxyaromatic with a dihaloaromatic;  
wherein the reaction is performed in the presence of a copper compound and cesium carbonate; and  
wherein the dihydroxyaromatic is present in an excess amount;  
reacting a 3- or 4-nitrophthalonitrile with the product of the previous step; and  
curing a mixture comprising the product of the previous step.
48. The process of claim 47:  
wherein the dihydroxyaromatic is selected from the group consisting of resorcinol, hydroquinone, and combinations thereof; and  
wherein the dihaloaromatic is selected from the group consisting of m-dibromobenzene, p-dibromobenzene, m-diiodobenzene, p-diiodobenzene, m-bromiodobenzene, p-bromiodobenzene, and combinations thereof; and
49. The process of claim 47,  
wherein the copper compound is selected from the group consisting of CuI and CuBr.
50. The process of claim 47,  
wherein the mixture comprises more than one phthalonitrile monomer.
51. The process of claim 47,  
wherein the mixture further comprises a compound selected from the group consisting of 4,4'-bis(3,4-dicyanophenoxy)biphenyl, bis[4-(3,4-dicyanophenoxy)phenyl]dimethylmethane, bis[4-(2,3-dicyanophenoxy)phenyl]dimethylmethane, bis[4-(3,4-dicyanophenoxy)phenyl]-bis(trifluoromethyl)methane, bis[4-(2,3-dicyanophenoxy)phenyl]-bis(trifluoromethyl)methane, 1,3-bis(3,4-dicyanophenoxy)benzene, and 1,4-bis(3,4-dicyanophenoxy)benzene.
52. The process of claim 47,  
wherein the mixture further comprises a compound with one or more phthalonitrile groups.
53. The process of claim 47,  
wherein the mixture further comprises a curing agent.
54. The process of claim 53,

wherein the curing agent is selected from the group consisting of aromatic amines, primary amines, secondary amines, diamines, polyamines, amine-substituted phosphazenes, phenols, strong acids, organic acids, strong organic acids, inorganic acids, metals, metallic salts, metallic salt hydrates, metallic compounds, halogen-containing aromatic amines, clays, and chemically modified clays.

55. The process of claim 53,

wherein the curing agent is selected from the group consisting of bis[4-(4-aminophenoxy)phenyl]sulfone, 1,4-bis(3-aminophenoxy)benzene, 1,12-diaminododecanediphenylamine, epoxy amine hardener, 1,6-hexanediamine, 1,3-phenylenediamine, p-toluenesulfonic acid, cuprous iodide, cuprous bromide, stannous chloride, stannous chloride hydrates, stannous chloride dihydrate, aluminum nitrate hydrates, aluminum nitrate nonahydrate, montmorillonite, and chemically modified montmorillonite.